TECHNOLOGY DIVISION


# THE SCIENCE NEWS-LETTER

*A Weekly Summary of Current Science*

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## NEW ELEMENTS DISCOVERED BY USE OF X-RAYS

Use of spectra obtained by passing a beam of x-rays through concentrated solutions of rare minerals has enabled Dr. Walter Noddack, of the University of Berlin, assisted by Otto Berg and Ida Tacke, to discover the missing chemical elements number 43 and 75, in the group with manganese in the periodic table. Traces of them have been detected in the concentrated solutions of platinum ores and of the minerals gadolinite and columbite, and it is estimated that they form a billionth of the earth's crust. Dr. Noddack has named them masurium and rhenium after the territories lost by Germany as a result of the peace treaty, the Masurian region of East Prussia on the east and the Rhine provinces on the West.

These new elements, were brought to light as a result of alaw discovered by Henry G. J. Moseley, a young British scientist who lost his life in Gallipoli during the war. When a beam of x-rays is reflected by a crystal or powdered crystals it is spread out into a band, after the manner of a beam of light passing through a glass prism. If this band is allowed to fall on a photographic plate, a series of light and dark lines is obtained, which is called the x-ray spectrum. The x-rays have very short wave lengths and therefore come at the extreme end of the spectrum, beyohd the ultra-violet waves.

After a study of the x-ray spectra of many elements, Moseley formulated a law which now bears his name, by means of which, if the atomic number of an element, or its position in the periodic table, is known, the character of its x-ray spectrum may be obtained. A few vacancies still exist in the 92 spaces of the table, but the characteristic spectra of the unknown elements can be calculated in advance, and when a substance is found to give this spectrum, there is no doubt of its identity.

Similar methods were used in 1922 by G. Hevesy and D. Coster at the Institute for Theoretical Physics at Copenhagen, to discover the missing element number 72, which was named Hafnium, after the Latin name for Copenhagen.

With the discovery of the new elements, there are only three vacant places left in the periodic system , which have the numbers 61, 85, and 87. These, like masurium and rhenium, which are numbers 43 and 75, are odd numbers, as it is a curious fact, pointed out by Professor Harkins of the University of Chicago, that in the case of elements of high atomic weights, those of even number are more common.

Noddack was trained under Nernst, the famous physical chemist of the University of Berlin.

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## LOOK OUT FOR A

By Dr. Edwin E. Slosson

We are beginning to learn our ABC's in the field of vitamins and even the groceryman can tell us which of his eatables are richest in those elusive but essential factors that the chemist has not yet been able to extract and identify.

Yet it is only twelve years since the first one was found, or to speak more accurately, found necessary. This is the one called "vitamin A" and its importance was discovered in the course of feeding experiments when it was found, contrary to what was then assumed, that all fats were not quite the same in food value, that lard was not so good as butter, and that olive oil was not so good as fish oil, and that white corn was not so good as yellow corn in promoting growth if they were the only source of fat in the ration. That is, all the fats and oils are almost equally edible and nutritious and digestible and useful in furnishing fuel to run the engines of the body, butsome of them, and only some of them, have in them besides a little of something else that the body must have for growth and health.

A new series of very carefully conducted experiments by Professor H. C. Sherman of Columbia have shown that vitamin A is also necessary for the production of offspring. He matched twin white rats of the same litter and sex. One set was fed whole milk powder; the other skimmed milk powder. In other experiments one set was fed butter fat and the other lard or coconut fat. In other respects the rations were the same, mostly ground whole wheat. The first set therefore lived on a diet containing an ample supply of vitamin A, while the other lot had a ration that was poor in vitamin A.

The difference was striking . Both lots of the rats grew up to maturity in about the same time, but the rats that had plenty of A grew bigger and lived longer and produced more young. The rats on the low-vitamin diet weighed only 69 per cent. as much as their better fed brethern. The rats that had plenty of A lived more than twice as long on the average.

But the most striking difference was in the breeding records. The 17 females on the diets richer in vitamin A had a total of 477 young of which they raised 264. The 17 females on the diets poorer in vitamin A gave birth to only 31, and none of these lived longer than two days. Both sets had plenty of the recently discovered "fertility vitamin " X or E, since wheat germ was in both rations.

Another significant fact is that the rats on the vitamin-poor diet showed a greater "susceptibility to infection and particularly a tendency to break down with lung disease at an age corresponding to that at which pulmonary tuberculosis so often develops in young men and women.

Animals that have lived on a liberal diet will store up enough vitamin A to last a long time if they are deprived of it. Nine-tenths of this is laidup in the liver. But it does not appear that any animal has the power to make this vitamin out of any foods that do not contain it. It is most abundant in cod-liver oil, butter, whole milk, liver, herring, egg yolk, alfalfa, clover, cabbage, carrots, sweet potatoes and spinach. It is practically absent from Irish potatoes, lean meat, malt extract, wheat bran, grapes, olive oil, corn oil, lard, tallow and yeast cakes, We do not need much of A, but we need that little much.

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## PARIS CHEMIST GETS CRYSTALS OF VITAMIN

Vitamin "C", the preventive of scurvy, has been obtained for the first time concentrated into crystalline form, by N. Bezssonoff, a Paris biochemist. M. Bezssonoff obtained his product by the concentration of a large quantity of the juice of cabbages, which vegetables have long veen recognized as effective in the prevention of scurvy. After the final treatment he had a quantity of colorless, needl shaped crystals that had the same effect in the prevention and cure of the disease as is shown by fresh fruits and vegetables, even when given in the minutest amounts. Scurvy could be prevented in rats, his test animals, by daily doses as small as two milligrams, or less than one one-hundred thousandth of an ounce. Chemical analysis of the crystals showed them to belong to the hydrocarbon group of organic substances; the compound has been given the technical name of "phenolic anthracene quinone"

Scurvy, the disease for which vitamin "C" is the preventive, used to be a terrible scourge in the old days of sailing ships, when men went on long voyages without adequate supplies of fresh vegetables. It manifested itself in general weakness and debility, distressing skin troubles, and the loosening and dropping out of the teeth. Its cure was discovered before its cause was discovered, simply because its cause consisted only in the absence of its cure. Its cause, as is now well known, is the absence of a certain definite food factor, called vitamin "C", and th supplying of vegetables and fruits that contain the vitamin prevents its development and also stops it where it has started. The isolation of this vitamin in pure form as crystals is M. Bezssonoff's contribution to the triumph of science over this disease.

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## DEADLY TSETSE FLY FOUND IN COLORADO

The tsetse fly, which in Africa carries the germ of sleeping sickness deadly to men and cattle, has been found in Colorado.

But there is no cause for alarm, for the flies have been dead and buried for one or two millions of years and are now known only by their fossil remains preserved in rock deposits near the foot of Pike's Peak.

Strange to say, fossil hunting expeditions under the direction of Prof. T.D.A Cockerell of the University of Colorado have been unable to find evidence that hou house flies , stable flies or blue-bottle flies plagued the early mammals, including ancestors of the horse, that lived in Colorado in those ancient times.

But four species of tsetse flies have been found although they are representatives of a genus no longer existing in the western hemisphere. It may be that tsetse flies spread disease in Colorado in Miocene times just as they now do in Afric

"We may therefore be thankful that they have all perished in our country, "Prof. Cockerell remarks, "though why they found Colorado was not the place to liv no one knows."

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## WOULD ADMIT GERMANS TO WORLD SCIENCE MEET

Scientists of Germany and other former enemy countries will be readmitted to the formal scientific councils of the world, if the plea of the American delegates is heeded at the International Research Council, which will convene at Brussels on July 7.

The International Research Council is one of the most important of the new world science bodies which have come into existence since the war, replacing the older international organizations which were disrupted by the outbreak of hostilities. According to the present membership rules, which were drafted in the earlier post-war days, nationals of former enemy countries are excluded. At present, however, a strong sentiment is growing up to change the rules so as to extend membership to the Central European scientists.

The National Research Council of the United States, which officially represents the International Research Council in this country, is taking a strong stand in favor of such modification of the membership regulations and is sending three representatives to the meeting of the International Research Council, instructed to try to have such modifications made. These representatives are Doctor W. W. Campbell, director of the Lick Observatory, and president of the University of California; Doctor James F. Norris, professor of chemistry, Massachusetts Institute of Technology; and Doctor Vernon Kellogg , permanent secretary of the National Research Council.

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## COMET'S TAIL LIKE AUTO EXHAUST

Carbon monoxide and carbon, two of the principal constituents of automobile exhaust form a large part of the tail of Tempel's Comet, discovered last week by J. Stobbe, of the Bergedorf Observatory, Hamburg, Germany, and now approaching the earth on one of the periodic visits it makes every five and one half years. The presence of these gases and of cyanogen, even more poisonous than carbon monoxide, has been shown by photographs of the spectrum made at the Yerkes Observatory. This was announced by Dr. Edwin B. Frost, director of the observatory.

In spite of the poisonous nature of the comet's tail, no alarm need be felt by residents of the earth, for in August , when it will be closest, it will still be over a hundred million miles away. "It probably will not be visible to the naked eye even then," says Prof. Frost.

Observations of the comet by Dr. G. Van Biesbroeck with the 40 inch telescope of the observatory have shown it to have a bright nucleus and a tail about three minutes of arc in length. On June 19, its position was eighteen hours and twenty seven minutes in right ascension and one degree south in declination, in the constellation of the Serpent. It is moving towards the southeast with a speed of about a quarter of a degree daily.

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Nearly 3,000,000 fowls were inspected for tuberculosis in the United States during the past spring.

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Persia has 24 telephone exchanges serving a total of 2,639 subscribers.

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# APES MORE EVOLVED THAN MAN, SAYS WASHINGTON SCIENTIST

The bodies of apes and monkeys are more evolved, that is, more highly specialized physically in many respects than the human body. Man has specialized on the production of a large and useful brain, and has allowed his body to remain in a relatively primitive state. These ideas, startlingly opposed to current notions, are put forth by Dr. Adolph H. Schultz, of the Carnegie Institution, in the Journal of the Washington Academy of Sciences.

In his review of the many resemblances between man and the apes, Dr. Schultz has made use of features that develop both before birth and during growth to adult stature. One of the outstanding examples of greater physical specialization in the lower animals is the disappearance of the thumb in certain species of monkeys, which goes along with the much-noticed lengthening of the arms in the direction of special adaptation for climbing. All that is left of the thumb in these monkeys is a mere stump or rudiment, though occasionally a specimen appears in which a longer thumb is evident.

Even in the matter of getting rid of a tail, certain of the apes have outevolved man, says Dr. Schultz ,for they have less of a rudimentary tail than man himself. And during the time before birth, man's tail is well-developed externally reaching a length nearly one-fifth that of his body. Sometimes the external tail in man persists after birth. A record case of the kind is cited with a byProf. Schultz , who shows a picture of a twelve-year-old boy from Indo-China with a tail nine inches long.

In the position of the eyes also the monkeys have gone farther from the primitive animal state than man has. In the lower animals the eyes are far apart, being indeed in many forms on quite opposite sides of the head. In the pre-natal development of both man and monkeys the eyes start far apart, and become relatively closer together as growth proceeds. But in man they remain noticeably farther apart than they do in many of the simians. In the development of the outer ear, however, man occupies an intermediate position; for while the ear of the chimpanzee is enormous compared with that of man, the gorilla's ear is just about of human size, and the ear of the orang is considerably smaller.

Another little-known feature described by Prof. Schultz is the so-called carpal hillock, a little fleshy projection on the wrist, crowned with a few long hairs or bristles. In some of the lower animals this is well developed and seems to serve as an organ of touch, but in most monkeys it is absent. However, in the fetuses of monkeys it is present, hairs and all, and once in a while it crops up in an adult monkey. In the human being before birth the same hillock appears and later vanishes, but it never has the hairs.

Prof. Schultz sums up his paper as follows: "The outstanding conclusions from these embryological studies can be summarized by stating that the many striking resemblances between man, ape, and monkey in early development , and their frequently closely corresponding growth changes can only be understood by assuming one common origin for all primates, including man, from which they inherited the tendency for the same ontogenetic processes which have become modified in many instances through a variety of later specializations. Furthermore, there exists ample evidence for the conclusion that the human body is in many points less specialized and hence has remained in some parts phylogenetically, as well as ontogenetically, more original and 'primitive' than have various other primates."

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## MOUNT WILSON EXPERIMENTS NOT FATAL TO RELATIVITY

Experiments performed by Dr. Dayton C. Miller, of the Case School of Applied Science, Cleveland, at the Mount Wilson Observatory, California, do not disprove the theory of relativity, as many astronomers have claimed, says Prof. A. S. Eddington, professor of astronomy at Cambridge University, England, in a letter to Nature. Referring to the article written for Science Service by Dr. Ludwik Silberstein, mathematical physicist of the Eastman Research Laboratory at Rochester, following Prof. Miller's presentation of his results at the recent meeting of the National Academy of Sciences at Washington, Prof. Eddington says, "The brief messages in regard to Prof. Miller's experiment have aroused much interest and bewilderment; it is therefore of great value to have Dr. Silberstein's authoritative account."

Prof. Miller's experiment was a repetition of one originally performed by Dr. Albert A. Michelson, now at the University of Chicago, and Prof. Edward Morley, by which a beam of light was divided into two parts and reflected back and forth indirections at right angles to each other. They were then reunited and a series of light and dark bands resulted. From the position of these bands the physicist can tell which beam takes the longest time to return. When first performed, in the basement of the Case School, Cleveland, in 1887, no effect was obtained, but when he repeated it last summer at Mt. Wilson, Prof. Miller obtained a marked effect.

Prof. Eddington disagrees with Dr. Silberstein's interpretation of the new experiment as indicating that the ether, by which light is supposed to be transmitted, is gliding over the earth with a speed which varies from about zero at sea level to about six miles per second at the altitude of the Mt. Wilson Observatory. "There is thus, " says the Cambridge astronomer, "a rapid rotational motion of this part of the ether."

In order to account for the astronomical facts, however, this motion must be the same at all levels, he continues. Just as a boat set to steer a straight course would be turned to one side if it entered a current of water moving at a different speed, a ray of light which is vertical at the level of Mt. Wilson would be inclined a small amount at sea level, and the direction in which it is inclined would vary according to the time of day or night. The amount of inclination would be about 7 seconds of arc, but astronomical observations capable of detecting a much smaller deflection have never revealed any such discordance of positions of stars as seen from sea level and mountain observatories.

"The Michelson-Morley experiment, "Prof. Eddington concludes, " was originally performed because it was thought - mistakenly as we now realize - that it would measure absolute ether drift. In the new application, it is invading a field in which the facts have long been established by delicate observations and it is difficult to regard it as a serious competitor."

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Farm boys of today are getting less education than any other group of children in the country, and the coming generation of farm women will be better educated than the farm men, according to a study of rural schools made by the U.S. Bureau of Education.

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Over 900 species of flowers grow in regions north of the Artic circle.

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## INDIANS ON INCREASE CENSUS BY ARCHAEOLOGIST REVEALS

Contrary to widely circulated reports that the "American Indian is dying off at an alarming rate in the great southwest", the Pueblos and other Indian populations are holding their own and increasing at a rate nearly as high as that shown by census figures for the white population.

Dr. Edgar L. Hewett, director of the School for American Research of the Archaeological Institute of Americaat Santa Fe, New Mexico, has transmitted to the American Association for the Advancement of Science a report of a census just made that shows that in the last decade the population of Pueblo villages has increased 22.2 per cent. and now totals to 10, 565. Only one Pueblo showed a decrease, and that was due to an influenza epidemic a few years ago.

During the same period the entire population of the United States increased 39 per cent., part of which was due to immigration. These figures Dr. Hewett considers adequate refutation of the general idea that there has been a "startling decrease in ourprimitive population."

"On the question of the Indian ceremonies, also , much emotion has been wasted," Dr. Hewett said. "They are vital in the life of the Indians. They are highly aesthetic in character, and are not attended by as immoral consequences as are the social dances of the whites. Nor are the ceremonies dying out or are they likely to. On the contrary ceremonies that had disappeared are being revived every year and the Indians are preserving their own self-respect by cherishing their native culture which has in it elements of nobilityworthy of any race. There is no religious persecution of the Pueblos, no effort is being made to suppress their dances unless pernicious features crop out, and in such cases the Indians are more amenable to advice than are the youth of our own race."

Recently published statements claiming an appalling prevalence of disease among the Indians are declared by Dr. Hewett to be misleading. A recent survey shows that venereal disease is only about as common among the Indians as among their white neighbors, and if compared with the colored population of the South the Indians are much the cleaner race. While trachoma is considered by Dr. Hewett to be the most serious disease among the Indians, he declared statements that "thousands of Indians are going blind from trachoma" are exaggerations. Much trachoma, mostly in the curable stage, has been discovered among the Indians, and government physicians are now engaged in an active compaign to wipe it out.

The question of titles to Pueblo lands is being adjusted by a lands board established by Congress, Dr. Hewett said in urging that appeals for money to bring in more lawyers should be ignored by those who have the interests of the Pueblos at heart.

"With the government's present Indian policy, liberal Congressional appropriations and many friendly societies and individuals, the future of the Pueblo Indians is fairly well assured," Dr. Hewett declared. "There is, however, always danger of 'too much white man's medicine'. It is what he does for himself that makes for his future character and progress."

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The U. S. Government is planning the exploration and survey of the Great Salt Lake Desert in Utah, one of the largest unsurveyed areas in the public domain.

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## SPEECH READING BEST AID TO HARD OF HEARING

Learning to "see" conversation by watching the lips of a speaker represents the best chance for a person who is losing his hearing to hold on to his place in the everyday world of work and play, Dr. Roy Gilpatrick, well known surgeon of Boston, told the American Federation of Organizations for the Hard of Hearing at its annual meeting in Minneapolis.

Successful speech reading does not ordinarily mean that the deafened person needs to read every word, he explained. With a great majority of speakers it is useless and wearying for the lip reader to try to do this. Nor can the student read perfectly the lips of every one he meets as soon as he learns the principles and has a little practice.

"Speech reading must be intensively studied," added Dr. Gilpatrick. "And the successful student must have the proper mental attitude, adaptability, concentration, keenness of observation, accuracy of deduction, and as much foreknowledge as possible. But when so mastered and applied, it can and does make the difference between success and failure, between being shut out of ordinary occupations and being admitted to them, between being able to lead a pretty normal existence and being denied such. Despite the limitations and difficulties, the practical value of speech reading is simply incalculable."

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## TWINING PLANTS RIVAL MUSCLES IN KIND OF MOVEMENTS

The long reaching shoots of twining plants in their movements to obtain a better grasp or a better place in the sun are almost human. This is revealed in a motion picture made by Dr. Frances Long and Vladimir Ulehla, of the Carnegie Institution's Desert Laboratory at Tucson, Ariz. It speeds up the motions of a twining plant, like the common morning-glory, 19,200 times when thrown on the screen and demonstrates that this plant has characteristics of movement similar in many respects to muscular contraction. So slow are the movements of vines and other such plants that the average person considers them quite inactive, but Dr. Long's researches show that plants are just as mobile in their way as animals.

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## SCIENCE AND RELIGION BOOK PRIZE AWARDED TO YALE PROFESSOR

The $6,000 prize from the Bross Foundation for the best book on the relation of science and religion offered by the Trustees of Lake Forest University has been awarded to Dr. Douglas Clyde MacIntosh for his work, "The Reasonableness of Christianity". Dr. MacIntosh is Dwight professor of theology at Yale University. The judges in the contest were Dr. Hugh T. Kerr, pastor of the Shadyside Presbyterian Church at Pittsburg, Pa., Dr. John MacIntosh, professor of the philosophy of religions of the McCormick Theological Seminary of Chicago, and Dr. Shailer Mathews, professor of historical and comparative theology at the University of Chicago.

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New diamond discoveries in the Pretoria district of the Transvaal Province in South Africa have been made in new fields known as the Rayton area adjoining the Pretoria diamond mines.

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## "WHO'S WHO" OF QUACKS URGED FOR PROTECTION OF DEAFENED

Keeping accurate records of the medical quacks who are exploiting the hard of hearing is advocated by Dr. Harold Rypins, Secretary of the New York State Board of Medical Examiners.

Gathering information about the training - or lack of training - and about the activities of medical quacks is not difficult, he pointed out at the Minneapolis meeting of the American Federation of Organizations for the Hard of Hearing. The annual directory of the American Medical Association gives a short account of the education of every practitioner of medicine in the country, together with his licensure, and medical associations and societies, departments of health, and boards of medical examiners readily give information to a cooperating agency.

Dr. Rypins urged that the hard of hearing protect themselves against charlatans by inquiring into the status of a physician before submitting to treatment. He also advocated that the individual who is losing his hearing should learn some of the basic facts about deafness and about his own condition, so that he can avoid incompetent treatment and so that he can cooperate intelligently with a specialist in saving as much of his hearing as possible.

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## VEGETABLE DIET SHORTENS RATS' LIVES

The vegetarians' idea that meat eaters are destined for an early grave receives little support from conclusions of Professor James R. Slonaker, Stanford University physiologist. After experimenting with rats for eight years, Professor Slonaker applies his findings to humans and declares that meat is essential if the human race is to continue.

White rats, under Professor Slonaker's care, reacted very definitely to vegetable and protein diets. The restricted, or vegetable, diet, caused a shortening of the span of life -- 33 per cent. in the males, and 40 per cent. in the females. Soon after meat was withdrawn from their diet, males lost 35 per cent. of their weight, females from 25 to 28 per cent. By the third generation, power of reproduction was wholly lost in the non-meat-eaters.

"This indicates", said Professor Slonaker, "that there is something lacking in vegetable food which is furnished by the supplementary animal protein. This may be due to additional protein in a form more readily utilized by the animal, or the particular protein may act as a stimulus, causing all cells of the body to become more active and thus making possible a greater and more complete use of the vegetable foods consumed."

Professor Slonaker claims that if man were subjected to the same treatment accorded his rats for a lifetime, results would generally be the same.

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Discovery of a tract of public land in the State of Wisconsin, which the Government did not know it owned, was recently made by surveyors of the U.S. General Land Office.

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TABLOID BOOK REVIEW

PRACTICAL BOTANY FOR HIGH SCHOOLS. By Willard N. Clute. Chicago: Mentzer, Bush and Co. 214 pages. 1924

To get hold of a modern botany text book like this, really written for high school students, makes one wish that the clock could be set back to permit the "grown up" botanist to get his first contact with the "amiable science" through something other than the trimmed-down and watered-out Strasburger course many of us had to contend with. Perhaps Mr. Clute might have made a good book better by leaving out a few more of the many-jointed technical terms, like "actinomorphic" and "entomophily"; but this is a minor point. Really important are the facts that his presentation is fresh and clear, that the pictures really illustrate, that the publishers have done a good job mechanically, and most important of all, that the volume has been kept down to a wieldy size.

MANUAL OF TREE AND SHRUB INSECTS. By Ephraim Porter Felt. New York: The Macmillan Company. 332 pages. $3.50 1924.

That this book will be welcomed by many teachers of horticulture and economic entomology goes without saying. But the home-owner and garden-lover also ought to have a copy in his library, against that evil day when a favorite tree or brush sickens or is invaded by a devouring host, and the frantic question arises: "What can I do?" The many clear illustrations furnish an excellent rogues' gallery of insect marauders, and the text tells what can be done against them.

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COLLEGES BLAMED FOR STUDENTS' FAILURE

When a student "flunks" from college or university, whose fault is it? Heretofore the failing student has usually been allowed to drop out of his classes for six months or a year to loaf or work, then return, "with his deficiencies remedied". Experiments conducted this spring by Franklin C. Paschal, professor of psychology and dean of men at the University of Arizona, lead Professor Paschal to lay most of the blame on the institutions. He reclaimed 80 per cent. of a group of ailing students without any loss of class time.

Professor Paschal selected 25 students from 80 who had failed in 50 per cent. of their college work. These students were given provisional registration and allowed to register for a maximum of 12½ units. They were required to present themselves three afternoons a week for supervised study. As a result, 20 were saved.

Lack of adequate high school preparation and lack of knowing how to study were found to be the most frequent causes of failure. Laziness, Dean Paschal said, is only a sympton. Other causes were extracurricular activities, financial difficulties, and general inability to carry a university program.

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In the past 40 years, the daily consumption of water per person in Chicago has increased from 125 gallons to 280 gallons.

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